EC / EEE 114 (R-22)

Total No. of Questions : 10] [Total No.of Pages : 04

I/IV B. Tech. DEGREE EXAMINATIONS, AUGUST - 2023

First Semester

EC / EEE

ELECTRICAL CIRCUIT ANALYSIS

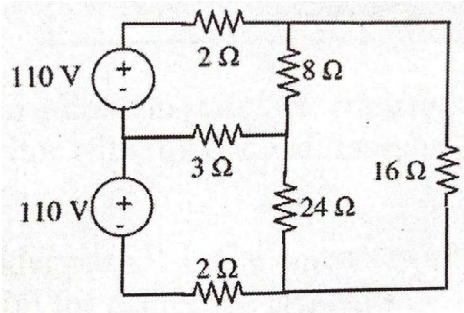
Time : **Three Hours** Maximum : **70** Marks

Answer All Questions

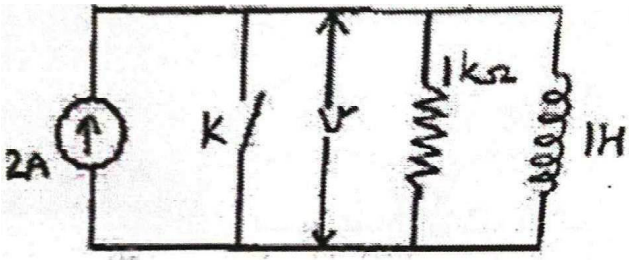
Answer ONE question from each Unit. **5x14=70 M**

UNIT - I

1. a) Using nodal analysis find all branch currents for the following circuit.



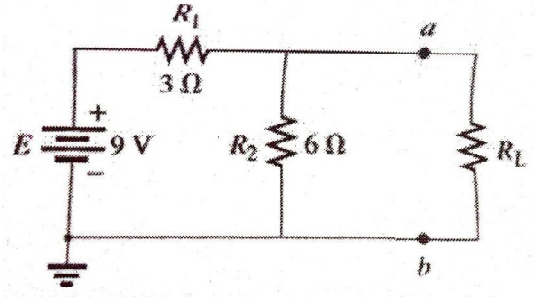
b) What is the duality principle ? Apply for the following.



(OR)

2. a) State and explain Thevnin's theorem with example.

b) Find Norton's equivalent for the following circuit.



P.T.O.

UNIT - II

3. a) Define and explain self and mutual inductance with suitable example ?

   b) How inductor and Capacitor will have at $t = 0^-$ and $t = 0^+$. Draw equivalent networks.

(OR)

4. a) A resistor of 50Ω, inductance of 100mH and a capacitance of 100μF are connected in series across 200V, 50Hz supply. Determine the following :

   (i) Impedance.

   (ii) Current flowing through the circuit.

   (iii) Power factor.

   (iv) Voltage across R, L & C.

   (v) Power in watts.

   b) Explain about dot convention in mutually coupled circuits.

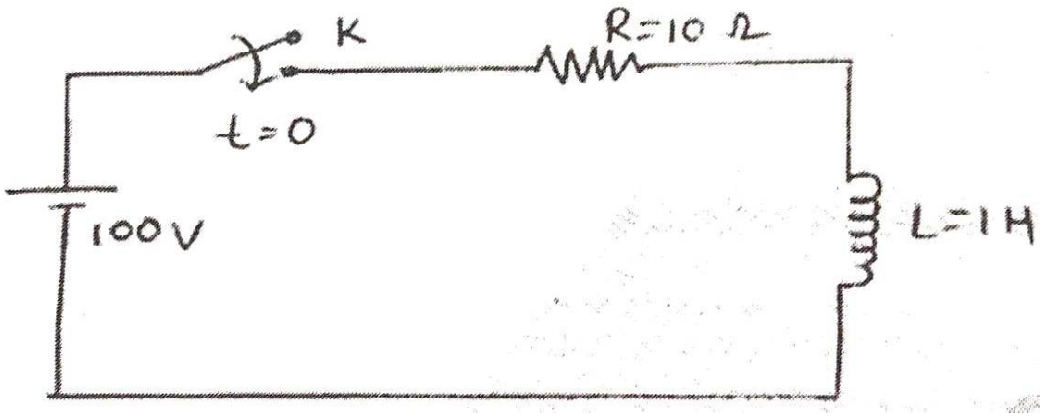
UNIT - III

5. a) What is time constant ? What are the time constants of series RL and RC circuits ?

   b) Explain in brief the concept of initial and final conditions.

(OR)

6. a) The switch is closed at t = 0 find values of I, $\frac{dl}{dt}, \frac{d^2l}{dt^2}, \frac{d^3l}{dt^3}$ at $t = 0^-$. Assume all initial current of inductor to be zero for circuit.

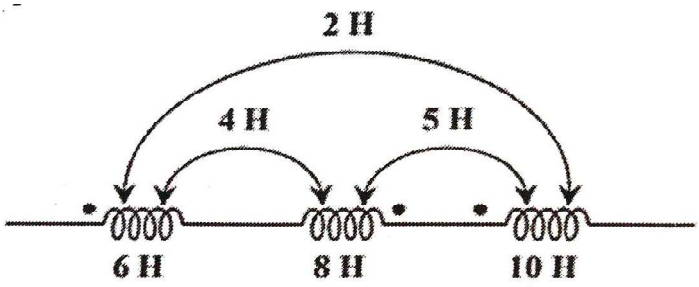


   b) Obtain s-domain (Laplace Transform) equivalent circuit diagram of an inductor and capacitor with initial conditions.

UNIT - IV

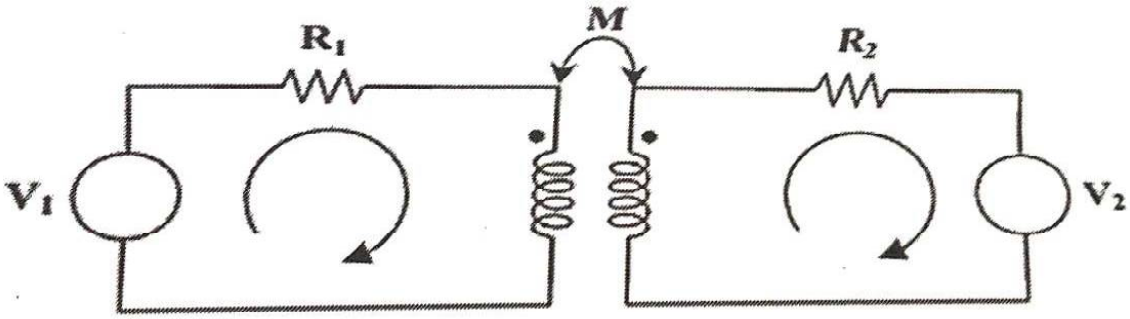
7. a) Consider pure R-L-C elements to which V(t) is connected individually, then determine the V(s) for respective elements.

   b) Calculate the total inductance of the given fig. and explain the advantages of magnetically coupling.



(OR)

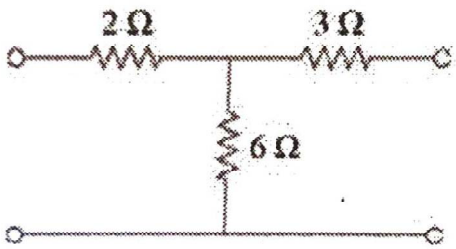
8. a) Given the circuit in Figure V1=V2=10V R1=R2 = 10 ohms, ωL1 = ωL2 = 10 and ωM=5, find the coupling coefficient, k, the currents in the primary and secondary circuits, 11 and 12 and the power absorbed.



   b) Obtain the expression for resonant frequency for parallel RL-RC circuit.

UNIT - V

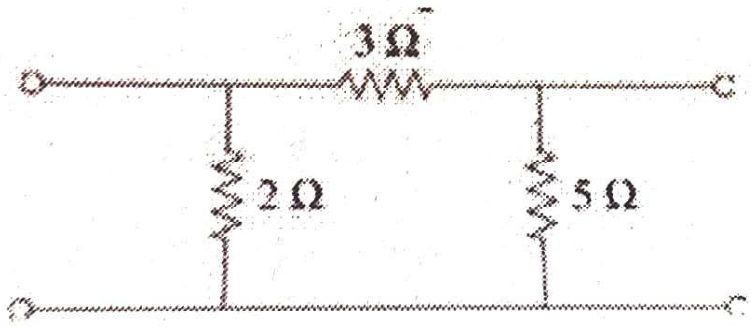
9. a) Find the ABCD parameters for the following circuit.



   b) Find the relationship between Z and h parameters.

(OR)

10. a) Find the Z-parameters for the following circuit.



b) Express Z parameters in terms of ABCD parameters.